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The Habitats of the Pellaeas

By E. J. Hill

While botanizing the present season along the Desplaines river and some of its tributaries between Lemont and Joliet, Ill., the habits of the cliff-brakes became a subject of special interest. *Pellaea atropurpurea* occurs quite abundantly on ledges of limestone bordering the flood plain of the river as well as on those by some of the smaller streams which have eroded their beds deep into the strata as they approach the gorge of the river. Numerous quarries are worked all along the river. The layers of rock are quite horizontal, and above the level of the flood-plain run back into the low hills and are heavily covered with drift. This has been removed in places to some distance back for the purpose of uncovering the stone, but as the ground rises the superincumbent earth becomes too deep to be taken off with profit, and the quarry is abandoned· Cliff-like, vertical walls are thereby left similar to those which have been made by natural agencies. The wall face thus exposed may have even a greater vertical height than those naturally formed. Some have evidently been left untouched by the quarrymen for many years. But no *Pellaea* was seen on any of these artificially made exposures, though various mosses and other forms of vegetation were well established. The fern, wherever found, grew upon rocks weathered to a dark gray, and with an exposure doubtless of many centuries' duration, or dating back to the time when a glacier carved out the rock bed of the river, its face only changing by the slow process of disintegration. In one locality the evidence was particularly strong. An island of rock had been left in the midst of the valley by the passage of the glacier around on either side, and on the old gray rock at the top of the ridge the fern was growing in plenty, but had not wandered down to a subsequently exposed rock-face made by quarrying below. This is not because the rock recently uncovered does not furnish cavities or shelves on which plants can readily grow, for the layers are relatively thin usually, from the thickness of flagstones to dimension stone two or three feet in depth, and crevices occur plentifully along the planes of joining. Besides the cliff-brake requires only a slight depression on which to grow. Tiny bunches of young plants, and fronds fruiting when less than an inch high, may be detected on the rocks. The plants wedge their roots into crevices so narrow that it is often difficult to get the bunch out intact. It is not easy to account for this preference of the fern for the old weathered surface. There is noticeable, however, a marked difference in the color of the recently exposed stone and that long subjected to weathering. Some chemical change is produced by atmospheric agencies, for the freshly exposed surfaces are soon stained with yellow or drab due to the presence of iron-oxide. This color is not seen on surfaces long exposed. The absence of the *Pellaea* may not be due to the presence of certain metallic ingredients in excess, but they suggest a possible or partial cause of it. I am able to state in addition that similar conditions have also existed in other localities where I have collected this fern, as witnessed by data on the herbarium labels. These were limestone cliffs in Kankakee county, Ill., they being formed in the same Niagara limestone as that along the Desplaines, the lower magnesian limestones along Root River, Preston, Minn., and the sandstone cliffs by Lake Mendota, Madison, Wis. I have seen the fern in other places, but no memoranda of its habitat being made at the time, I cannot speak with accuracy, but am impressed with the recollection that the exposures were very old. Most authorities that mention the kind of rock on which the cliff-break grows give limestone, but sandstone or other habitats are also mentioned.

Another feature in the behavoir of *Pellaea atropurpurea* is its aversion to shade. In the localities along the Desplaines it is mostly found in quite bright sunlight and on rock faces exposed in such a way as to be not only dry but very warm. Wherever the ledges were shaded but a little by trees the *Pellaea* ceased to grow. Some streams entering the river were examined. One had cut a deep gorge in the limestone below Lockport, and there were numerous exposures of the gray-weathered stone. But the fern was only seen in one place where a sharp bend in the stream, with the comparative absence of trees to shade it, gave the cliff a full exposure to the south. Another stream had made its way down to the river valley and formed a little waterfall where it emerged from the layers of rock. The projecting faces which flanked the basin below the fall were fully exposed to the sunlight and were well stocked with the plant. Above the fall was a little rocky glen, in dark shade, moist and covered with various kinds of moss and other shade-loving plants. Here the smaller cliff-brake, *Pellaea Stelleri*, found a congenial home, interspersed with *Cystopteris bulbifera*, *Marchantia polymorpha* and another Liverwort, *Asterella hemispherica*. It is a fern of quite different habit, showing its preference for rocks, but needing shade and moisture, as well as moss or decaying vegetable and rock-matter, in which its slender, horizontal rootstocks can run. It is the second locality in which I have met with this cliff-brake in Illinois, the other being a similar ravine or rock-cutting made by a brook entering the Kankakee river below the city of Kankakee. I have no information of its presence elsewhere in the state. Both stations are quite far south for it, and it must be here well-nigh the southern limits of its range.

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